

**Claims**

1. Process for extract purification of sugar beet raw juice, comprising:

a) preliming of the raw juice by adding milk of lime until a concentration of about 0.1 to 0.3 g of CaO/100 ml of raw juice has been attained for precipitation or/and coagulation of non-sucrose substances in the form of a coagulate,

b) addition of at least one copolymer of acrylamide and sodium acrylate having a molar mass of about 5 million to about 22 million as a polyanionic flocculant up to a concentration of 1 to 8 ppm,

c) removal of the coagulate from the preliming juice using at least one first removal apparatus to obtain a clear preliming juice,

d) main liming of the preliming juice obtained after removal of the coagulate by adding milk of lime until a concentration of about 0.6 g of CaO/100 ml in the clear preliming juice has been attained, and

e) performance of a first carbonatation by introducing carbon dioxide into the main liming juice and optional subsequent performance of a second carbonatation.

2. Process according to claim 1, wherein 1 to 3 ppm of flocculant are added.

3. Process according to one of claims 1 and 2, wherein the first removal apparatus used is a static or dynamic decanter.

4. Process according to one of claims 1 and 2, wherein the first removal apparatus used is a centrifuge.

5. Process according to claim 4, wherein the centrifuge is a pan centrifuge or decanter centrifuge.

6. Process according to one of claims 1 to 5, wherein the removed coagulate is concentrated further using a second removal apparatus by removing a further clear preliming juice.

7. Process according to claim 6, wherein the second removal apparatus used is one or more membrane filter press(es).

8. Process according to claim 6, wherein the second removal apparatus used is one or more decanter centrifuge(s) and/or pan separators and/or vacuum rotary filters.

9. Process according to one of claims 1 to 8, wherein a concentrated coagulate having a dry substance content of 40% to 70% is obtained.

10. Process according to one of claims 1 to 9, wherein the clear preliming juices obtained using the first and second removal apparatus are combined and subjected to a main liming.

11. Process according to claim 10, wherein the main liming juice obtained in the main liming is subjected to a

first carbonatation by adding carbon dioxide to obtain a first carbonated juice.

12. Process according to claim 11, wherein the pH of the main liming juice is lowered stepwise to from 10.6 to 11.4 by adding carbon dioxide.

13. Process according to claim 11 or 12, wherein the first carbonated juice is filtered by means of a candle filter to obtain a first carbonated juice concentrate and a first clear carbonatation juice.

14. Process according to claim 13, wherein a portion of the first carbonated juice concentrate is used for the preliming of the beet raw juice.

15. Process according to claim 13, wherein the first clear carbonatation juice is subjected to a second carbonatation by adding carbon dioxide to obtain a second carbonated juice.

16. Process according to claim 15, wherein the second carbonated juice is concentrated by removing a second clear carbonatation juice by means of a filter separator to obtain a second carbonated juice concentrate.

17. Process according to claim 13 and 16, wherein the first and second carbonated juice concentrate are combined and concentrated further by means of a membrane filter press to obtain a carbolime.

18. Process for reducing the lime consumption in the extract purification of sugar beet raw juice, comprising:

- a)       preliming of the raw juice by adding milk of lime up to about 0.1 to 0.3 g of CaO/100 ml of raw juice for precipitation or coagulation of non-sucrose substances in the form of a coagulate,
- b)       addition of at least one copolymer of acrylamide and sodium acrylate having a molar mass of about 5 million to about 22 million as a polyanionic flocculant up to a concentration of 1 to 8 ppm,
- c)       removal of the coagulate from the preliming juice using at least one first removal apparatus to obtain a clear preliming juice,
- d)       main liming of the preliming juice obtained after removal of the coagulate by adding milk of lime up to about 0.6 g of CaO/100 ml to the clear preliming juice, and
- e)       performance of a first carbonatation by introducing carbon dioxide into the main liming juice and subsequent performance of a second carbonatation without intermediate postliming.

19.       Process according to claim 18, wherein 1 to 3 ppm of flocculant are added and the first removal apparatus used is a static decanter.

20.       Process according to claim 18, wherein 1 to 8 ppm of flocculant are added and the first removal apparatus used is a pan centrifuge or decanter centrifuge.

21.       Process according to one of claims 18 to 20, wherein the coagulate removed is concentrated further using a second

removal apparatus by removing a further clear preliming juice.

22. Process according to claim 21, wherein the second removal apparatus comprises one or more decanter centrifuge(s) and/or pan separators and/or vacuum rotary filters or/and one or more membrane filter press(es).

23. Process according to one of claims 18 to 22, wherein the clear preliming juices obtained using the first and second removal apparatus are combined and subjected to a main liming.

24. Process according to claim 23, wherein the main liming juice obtained in the main liming is subjected to a first carbonatation by adding carbon dioxide to obtain a first carbonated juice.

25. Process according to claim 24, wherein the first carbonated juice is filtered by means of a candle filter to obtain a first carbonated juice concentrate and a clear carbonatation juice.

26. Process according to claim 25, wherein the first clear carbonatation juice is subjected to a second carbonatation by adding carbon dioxide to obtain a second carbonated juice.

27. Process for producing a nutrient-rich non-sucrose substance concentrate from sugar beet raw juice, comprising:

a) preliming of the raw juice by adding milk of lime up to about 0.1 to 0.3 g of CaO/100 ml of raw juice for

precipitation or coagulation of the non-sucrose substances present in the raw juice in the form of a coagulate,

b) addition of at least one copolymer of acrylamide and sodium acrylate having a molar mass of about 5 million to about 22 million as a polyanionic flocculant up to a concentration of 1 to 8 ppm,

c) removal of the coagulate from the preliming juice using at least one first removal apparatus.

28. Process according to claim 27, wherein the non-sucrose substances present in the raw juice are high molecular weight protein substances, polysaccharides and cell wall constituents, and also low molecular weight organic or inorganic acids, amino acids and mineral substances.

29. Process according to claim 28, wherein the cell wall constituents are pectin substances, lignin, cellulose and hemicellulose.

30. Process according to claim 28, wherein the polysaccharides are levan and dextran.

31. Process according to claim 28, wherein the protein substances are proteins, nucleoproteins and betaine.

32. Process according to one of claims 28 to 31, wherein 1 to 3 ppm of flocculant are added.

33. Process according to claim 32, wherein the first removal apparatus used is a static or dynamic decanter.

34. Process according to one of claims 27 to 31, wherein the first removal apparatus used is a pan centrifuge or

decanter centrifuge.

35. Process according to one of claims 27 to 34, wherein the removed coagulate is concentrated further using a second removal apparatus.

36. Process according to claim 35, wherein the second removal apparatus comprises one or more decanter centrifuge(s) and/or pan separator(s) and/or vacuum rotary filters and/or a membrane filter press(es).

37. Process according to one of claims 27 to 36, wherein a concentrated coagulate with a dry substance content of 40% to 70% is obtained.

38. Process according to claim 37, wherein the concentrated coagulate is comminuted and dried.

39. Non-sucrose substance concentrate, comprising a dewatered coagulate of non-sucrose substances made from sugar beet raw juice, obtainable using a process according to one of claims 1 to 17 or a process according to one of claims 27 to 38 by preliming the raw juice with addition of milk of lime and a flocculant for precipitation or coagulation of non-sucrose substances and removal of the separated or coagulated non-sucrose substances from the raw juice.

40. Non-sucrose substance concentrate according to claim 39, wherein the non-sucrose substances are high molecular weight protein substances, polysaccharides and cell wall constituents, and also low molecular weight organic or inorganic acids, amino acids and mineral substances.

41. Non-sucrose substance concentrate according to claim 39 or 40, wherein the concentrate has a high phosphorus content.

42. Use of a non-sucrose substance concentrate according to one of claims 39 to 41 as a fertilizer or soil improver.

43. Use of a non-sucrose substance concentrate according to one of claims 39 to 41 as an animal feed.

44. Use according to claim 43, wherein the non-sucrose substance concentrate is comminuted, mixed with molasses and dried.

45. Apparatus for preliming sugar beet raw juice and/or for obtaining a non-sucrose substance concentrate which consists of a concentrated coagulate of non-sucrose substances made from sugar beet raw juice, comprising at least one vessel (3) for milk of lime treatment of the raw juice for coagulation of the non-sucrose substances present in the raw juice, said vessel having at least one inlet (5) for the raw juice, at least one inlet (7) for milk of lime and an outlet (9) for discharge of the prelimed raw juice, and at least one first removal apparatus (11) for removing the coagulate slurry obtained in the preliming from the preliming juice, said removal apparatus having an inlet (13), connected to the outlet (9) of the vessel, for the preliming juice, a first outlet (15) for discharge of the clear preliming juice removed from the coagulate slurry, and a second outlet (17) for discharge of the coagulate slurry.



46. Apparatus according to claim 45, wherein the first removal apparatus is a static or dynamic decanter or a centrifuge.

47. Apparatus according to claim 45 or 46, wherein the centrifuge is a pan centrifuge or decanter centrifuge.

48. Apparatus according to one of claims 45 to 47, wherein the second outlet of the first removal apparatus is connected via a feed line to a second removal apparatus for further concentration of the coagulate slurry.

49. Apparatus according to claim 48, wherein the second removal apparatus has an inlet for the coagulate slurry discharged from the first removal apparatus, a first outlet for the discharge of the clear preliming juice obtained in the coagulate slurry concentration, and a second outlet for discharge of the concentrated coagulate slurry.

50. Apparatus according to claim 48 or 49, wherein the second removal apparatus comprises one or more membrane filter press(es) or at least one centrifuge or vacuum rotary filter.

51. Apparatus according to claim 50, wherein the centrifuge is a pan separator or a decanter centrifuge.